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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/700,245	11/03/2003	Wenshen Wang	NGC-211/11-1114	3759
32205	7590	09/20/2005	EXAMINER	
PATTI & BRILL ONE NORTH LASALLE STREET 44TH FLOOR CHICAGO, IL 60602			PENG, CHARLIE YU	
			ART UNIT	PAPER NUMBER
			2883	

DATE MAILED: 09/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/700,245	Applicant(s) WANG ET AL.	
	Examiner Charlie Peng	Art Unit 2883	

AK

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

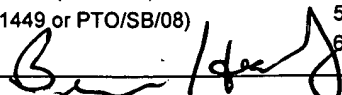
- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
 Paper No(s)/Mail Date \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

  
 Brian Healy  
 Primary Examiner

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 4, 6-9, and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,436,613 to Fallahi et al. in view of U.S. Patent 5,339,369 to Hopper et al. Fallahi teaches a laser diode with an integrated p-i-n section that comprises a p-type region **68** having a front contact (electrode) **66**, and i or intrinsic region **70** having two feedback gratings **76** on either sides, and an n-type region **72** with a backside contact (electrode) **74**. (See at least **Fig. 17** and its descriptions) Since the gratings show widths in Fig. 17 and the laser diode has a depth, the gratings at least extends in two dimensions. The diode laser can be a distributed feedback laser (DFB) or a distributed Bragg reflector (DBR) laser. Light is resonated between feedback gratings **76**, which serve as partial reflectors. The fact that light is propagating and being reflected within the intrinsic layer teaches the presence of an optical waveguide. The fact that the light is propagating and being reflected within the intrinsic layer simultaneously teaches that the light is propagating down the waveguide in a "Zig-Zag" manner. Fallahi further teaches that electrodes can be deposited on the feedback gratings whereas the optical index is varied by the electrode. (See **Column 14, paragraph 3**) Fallahi still further teaches that silicon substrates can be used as heat

Art Unit: 2883

sinks and optical benches for optoelectronic chips such as laser diodes. (**Column 3, paragraph 1**) Fallahi still further teaches that it is preferred to integrate a sol-gel based grating with a ridge InGaAsP/InP multiple quantum well structure. (**Column 12, paragraph 6 to Column 13, paragraph 2**) Fallahi does not teach the electrodes receiving RF signal, but such a concept is known in the art. Hopfer teaches an improved high-speed external electro-optical modulator, modulated by RF signal applied on electrodes, which velocity matches the RF waves with the optical waves. (See at least Abstract by Hopfer) It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply RF signal to the electrodes in contact with the p-i-n section. The motivation would be to have RF signal propagate at the same speed as the optical waves during the interaction distance in order to decrease optical distortion. As Fallahi's laser diode fully meets the structural limitations as claimed by the Applicant, it is at least capable of performing the same function(s).

The method claims merely stated the most logical and obvious way of modulating using the semiconductor optical modulator already taught by Fallahi and Hopfer, and they are also rejected.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fallahi and Hopfer further in view of U.S. Patent 6,870,624 to Hobbs et al. Fallahi and Hopfer do not teach using etched holes to serve the functionality of gratings, but such structure is known in the art as "photonic bandgap" crystals. Hobbs gave a detailed review of this technology. (See **Column 2, first paragraph**) It would have been obvious to one having ordinary skill in the art to use a photonic bandgap material (or one with plurality

Art Unit: 2883

of holes etched within) to serve the functionality of the gratings. The motivation would be to take advantage of the wavelength selective nature of photonic materials, and that they are typically more compact than arrayed waveguide gratings and is also not limited by multiple diffraction orders.

Claims 5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fallahi and Hopfer further in view of U.S. Patent 6,822,982 to Yoshida et al. Fallahi and Hopfer teach all the limitations except for the diffraction gratings being formed by a Quantum dots material. Yoshida also teaches a PIN structured semiconductor laser having a n-InP layer **2**, a spacer (intrinsic) layer **4**, a p-InP cladding **6**, and an active layer (waveguide) **3** with gratings **13a 13b** on both sides. (See at least **Fig. 15A** and its descriptions) Yoshida further teaches that the active layer may be a quantum dot structure. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a quantum dot structure taught by Yoshida as the grating material in the invention by Fallahi. The motivation would be that quantum dots structures allows higher density of spaced dots and thus smaller size of gratings, and smaller sizes of components are always advantageous in microelectronics.

### ***Response to Arguments***

Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

The applicant argues what the examiner considers prior art stated in admission, specifically Paragraph [0002], is not an admission of prior art and that it follows the heading "Field of the Invention". In fact, in the specification submitted 03 November

Art Unit: 2883

2003, on page 1, Paragraph [0002] immediately follows the heading "2. Discussion of the Related Art". Furthermore, Paragraph [0002] states that EO modulation devices "are known in the art" to "use an electrical signal to frequency modulate an optical signal..." and "one class of modulation devices of this type" of EO modulation devices uses an RF signal "applied to electrodes in contact with the P and N layers to provide the modulation voltage, where the electrodes define an RF transmission line". Contrary to the applicant's argument, the examiner re-asserts that Paragraph [0002] is a clear statement and admission of what is known in the art.


### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Please see form PTO-892 for additional references cited.

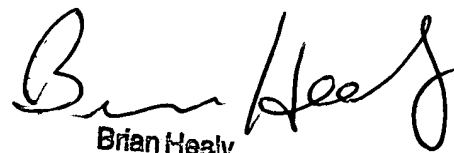
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charlie Peng whose telephone number is (571) 272-2177. The examiner can normally be reached on 9 am - 6 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Charlie Peng  
Charlie.Peng@uspto.gov  
September 14, 2005



Brian Healy  
Primary Examiner